

AMENDMENTS TO THE CLAIMS

The following is a complete listing of the claims indicating the current status of each claim and including amendments currently entered as highlighted.

1. (Currently Amended) An optical wavelength converter, comprising:
  - an optical sum frequency generator;
  - an optical difference frequency generator;
  - a continuous-wave optical beam source;
  - a splitter having an input coupled to a converter input and having a first splitter output and a second splitter output;
  - a first combiner having a first input coupled to the first splitter output, a second input coupled to an output of the continuous-wave optical beam source, and an output coupled to an input of the optical sum frequency generator, the first combiner being integrally formed in a crystal with the optical sum frequency generator and
  - a second combiner having a first input coupled to an output of the optical sum frequency generator, a second input coupled to the second splitter output, and an output coupled to the input of the optical difference generator.
  
2. (Currently Amended) The optical wavelength converter claimed in claim 1, wherein:
  - at least part of the crystal of the optical sum frequency generator comprises is
  - a three-wave mixing periodically-poled crystal; and
  - the optical difference frequency generator comprises a three-wave mixing periodically-poled crystal.

3. (Currently Amended) The optical wavelength converter claimed in claim 1, wherein ~~the at least part of the crystal associated with~~ of the optical sum frequency generator is poled in accordance with a poling function that included harmonics of at least one predetermined poling frequency.

4. (Cancelled)

5. (Original) The optical wavelength converter claimed in claim 1, further comprising a depolarizer coupled between the converter input and the splitter.

6. (Original) The optical wavelength converter claimed in claim 1, wherein the optical beam source is a continuous-wave pump laser.

7. (Original) The optical wavelength converter claimed in claim 6, wherein the laser is a single-frequency laser diode.

8. (Original) The optical wavelength converter claimed in claim 6, wherein the laser is a diffraction feedback laser diode.

9. (Original) The optical wavelength converter claimed in claim 6, wherein the laser is tunable.

10. (Original) The optical wavelength converter claimed in claim 1, wherein the second combiner is integrally formed in a crystal with the optical difference frequency generator.

11. (Original) The optical wavelength converter claimed in claim 10, wherein the second combiner comprises two waveguides having outputs coupled together, and at least one of the two waveguides is adiabatically tapered to match modes propagating in one of the two waveguides to modes propagating in the other of the two waveguides.

12. (Cancelled)

13. (Currently Amended) The optical wavelength converter claimed in claim 12, wherein the first combiner comprises two waveguides having outputs coupled together, and at least one of the two waveguides is adiabatically tapered to match modes propagating in one of the two waveguides to modes propagating in the other of the two waveguides.

14. (Original) The optical wavelength converter claimed in claim 1, wherein the splitter produces two output signals having linear, orthogonal polarizations.

15. (Original) The optical wavelength converter claimed in claim 14, wherein:  
polarization-maintaining single-mode fiber couples the first input of the first combiner to the first splitter output; and  
polarization-maintaining single-mode fiber couples the second input of the first combiner to the output of the continuous-wave optical beam source.

16. (Original) The optical wavelength converter claimed in claim 15, further comprising a polarization rotator coupling the second splitter output to the second input of the second combiner.

17. (Original) The optical wavelength converter claimed in claim 1, further comprising a high-pass filter coupling the output of the optical sum frequency generator to the first input of the second combiner, the high-pass filter having a cutoff frequency of approximately the sum of a frequency of the optical beam source and a frequency of a signal received at the converter input.

18. (Original) The optical wavelength converter claimed in claim 1, further comprising a bandpass filter coupling the output of the optical difference frequency generator to the converter output, the bandpass filter having a passband centered at approximately the frequency of the optical beam source.

19. (Original) The optical wavelength converter claimed in claim 1, further comprising amplitude control circuitry including a controller coupled in feedback relation in a signal path of the optical wavelength converter.

20. (Original) The optical wavelength converter claimed in claim 19, further comprising an amplifier coupling the converter input to the input of the splitter, wherein the controller has an input coupled to an output of the amplifier and a first output coupled to an input of the amplifier to provide feedback-controlled amplitude adjustment of the amplifier.

21. (Original) The optical wavelength converter claimed in claim 20, wherein the controller has a second output coupled to an input of the optical beam source to provide feedback-controlled amplitude adjustment of the optical beam source when adjustment of the amplifier is insufficient to achieve stability.

22. (Currently Amended) The optical wavelength converter claimed in claim 19, wherein the controller has an input coupled to an output of the difference frequency generator to provide feedback-controlled amplitude adjustment of the amplifier.

23. (Original) The optical wavelength converter claimed in claim 22, wherein the controller has a second output coupled to an input of the optical beam source to provide feedback-controlled amplitude adjustment of the optical beam source when adjustment of the amplifier is insufficient to achieve stability.

24. (Original) The optical wavelength converter claimed in claim 19, further comprising an amplifier coupling the converter input to the input of the splitter, wherein the controller has an input coupled to an output of the optical beam source and a first output coupled to a gain input of the amplifier to provide feedback-controlled amplitude adjustment of the amplifier.

25. (Original) The optical wavelength converter claimed in claim 24, wherein the controller has a second output coupled to an input of the optical beam source to provide feedback-controlled amplitude adjustment of the optical beam source when adjustment of the amplifier is insufficient to achieve stability.

26. (Cancelled)

27. (Cancelled)

28. (Cancelled)

29. (Cancelled)

30. (Cancelled)

31. (Original) An optical wavelength converter, comprising:  
a plurality of optical sum frequency generators integrally formed with each other in a crystal;  
a plurality of optical difference frequency generators integrally formed with each other in a crystal;  
a plurality of continuous-wave optical beam sources;  
a plurality of splitters, each having an input coupled to one of a plurality of converter inputs and having a first splitter output and a second splitter output;  
a plurality of first combiners, each having a first input coupled to a corresponding one of the first splitter outputs, a second input coupled to an output of a corresponding one of the continuous-wave optical beam sources, and an output coupled to an input of a corresponding one of the optical sum frequency generators;  
a plurality of second combiners, each having a first input coupled to an output of a corresponding one of the optical sum frequency generators, a second input coupled to a corresponding one of the second splitter outputs, and an output coupled to an input of a corresponding one of the optical difference generators; and  
a multiplexer having a plurality of inputs, each coupled to an output of a corresponding one of the difference frequency generators, and having a converter output.

32. (Currently Amended) The optical wavelength converter claimed in claim 31, wherein:

the crystal of the optical sum frequency generators comprises a three-wave mixing periodically-poled crystal; and

the crystal of the optical difference frequency generators comprises a three-wave mixing periodically-poled crystal.

33. (Original) The optical wavelength converter claimed in claim 31, wherein each of the first combiners is integrally formed in the crystal with each of the optical sum frequency generators.

34. (Original) The optical wavelength converter claimed in claim 31, wherein each of the second combiners is integrally formed in the crystal with each of the optical difference frequency generators.

35. (Currently Amended) A method for converting a frequency of an optical input beam carrying a communications signal, comprising:  
receiving the optical input beam at a converter input producing a continuous-wave beam;  
splitting the optical input beam into first and second split beams;  
producing a sum signal having a frequency equal to a sum of a frequency of the first split beam and a frequency of the continuous-wave beam;  
producing a difference signal having a frequency equal to a difference between a frequency of the sum signal and a frequency of the second split beam  
rotating a polarization of the second split beam; and

outputting the difference signal at a converter output; whereby the signal output at the converter output represents a modulation of the continuous-wave beam with the communications signal.

36. (Cancelled)

37. (Original) The method claimed in claim 35, further comprising the step of high-pass filtering the sum signal at a cutoff frequency of approximately the sum of a frequency of the optical input beam and a frequency of the continuous-wave beam.

38. (Original) The method claimed in claim 35, further comprising the step of bandpassfiltering the difference signal at a passband frequency centered at approximately a frequency of the continuous-wave beam.

39. (Original) The method claimed in claim 35, further comprising the step of stabilizing an amplitude of a signal responsive to one of said optical input beam and said continuous-wave beam in response to a feedback signal.

40. (Original) The method claimed in claim 35, further comprising the step of depolarizing the optical input beam before the splitting step.